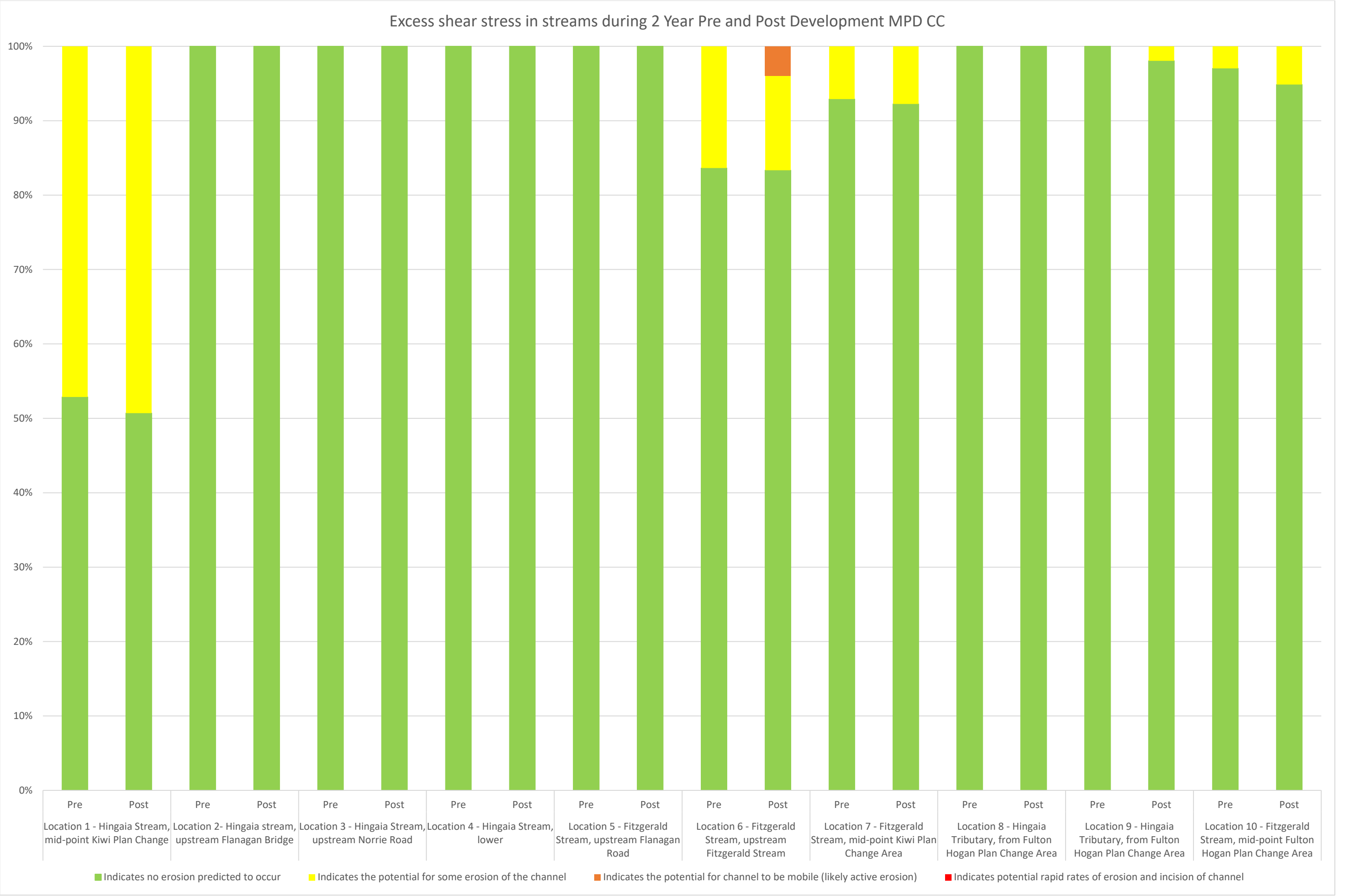


This table summarises the information included within this excel spreadsheet

Tab name	Purpose
Summary	Summary results used within the RFI erosion memo
Chart1	Summary chart and tabular results of excess shear stress and threshold exceedence during a 2 year event
2yr shear stress	
Chart2	Summary chart and tabular results of excess shear stress and threshold exceedence during a 10 year event
10yr shear stress	
Chart3	Summary chart and tabular results of excess shear stress and threshold exceedence during a 100 year event
100yr shear stress	
Location 1	Shear stress over 24 hour design storm event for 2, 10, and 100 year events, for pre- and post-development scenarios at each location
Location 2	
Location 3	
Location 4	
Location 5	
Location 6	
Location 7	
Location 8	
Location 9	
Location 10	
Sensitivity - Location 1	Sensitivity analysis at each chosen location for 2 year event
Sensitivity - Location 2	

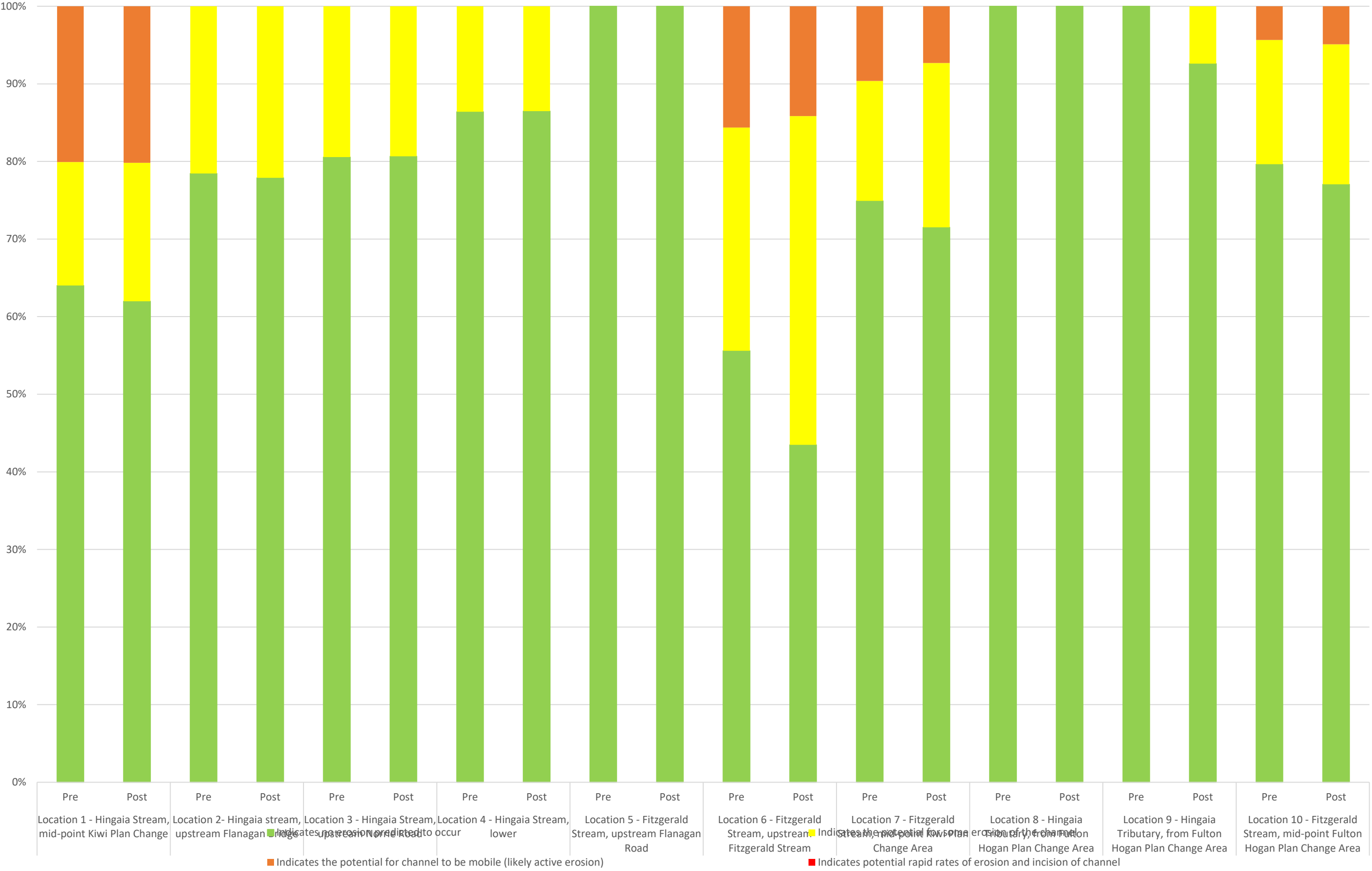
K-section		Location 1 - Hingaia Stream, mid-point Kiwi Plan C				Location 2 - Hingaia stream, upstream Flana				Location 3 - Hingaia Stream, upstream Norrie Roa				Location 4 - Hingaia Stream, lower				Location 5 - Fitzgerald Stream, upstream Flanagan				Location 6 - Fitzgerald Stream, upstream Fit				Location 7 - Fitzgerald Stream, mid-point Kiwi Plan				Location 8 - Hingaia Tributary, from Fulton				Location 9 - Hingaia Tributary, from Fulton Hogan				Location 10 - Fitzgerald Stream, mid-point Fulton Hogan Plan Change Area					
Development Boundary shear		Pre	Post			Pre	Post			Pre	Post			Pre	Post			Pre	Post			Pre	Post			Pre	Post			Pre	Post			Pre	Post								
		2 Yr	45.966		45.966		32.024		32.473		21.378		21.337		10.798		10.907		14.995		22.177		57.504		85.98		39.31		63.428		15.541		24.402		21.489		33.811		36.06		62.824		
		10 Yr	86.427		86.427		40.6		40.559		58.126		58.266		16.609		103.119		160.173		84.827		103.119		160.173		84.827		103.119		16.112		22.983		29.601		50.097		90.005		91.881		
		100 Yr	101.721		101.721		45.082		45.082		62.326		59.517		75.689		71.618		16.268		23.314		113.982		232.247		82.374		92.825		13.754		16.585		41.419		52.497		109.562		109.305		
Excess shear		2 Yr	1.41000		1.41000		0.98233		0.99610		0.65451		0.33457		0.45997		0.68028		1.76393		2.63742		1.03563		2.63742		1.03715		1.94564		2.63742		0.74853		0.65917		1.10613		1.92712				
		10 Yr	2.65113		2.65113		1.24414		1.24540		1.78301		1.78730		1.31890		1.33656		0.40028		0.50948		3.16583		4.91328		2.60206		3.16316		0.49423		0.70500		0.90801		1.53672		2.76089		2.81844		
		100 Yr	3.12028		3.14733		1.38288		1.38288		1.91184		1.82567		2.32175		2.19687		0.49902		0.71515		3.49638		7.12414		2.62190		2.84739		0.50874		1.27052		3.36080		3.35291		3.35291				
Frequency of exceedence (2Yr)		<1	730		700		1381		1381		1381		1381		1381		1381		1381		1155		1151		1283		1274		1381		1381		1381		1354		1340		1310				
		>1 & <2	651		681		0		0		0		0		0		0		0		226		175		98		107		0		0		0		27		41		71				
		>2 & <10	0		0		0		0		0		0		0		0		0		0		55		0		0		0		0		0		0		0		0				
		>10	0		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0				
Calculations																																											
Change in excess shear		0.00000				0.01377				-0.00126				0.00334				0.22031				0.87350				0.73982				0.27181				0.37798				0.82098					
Duration of exceedence		<1	53%		51%		100%		100%		100%		100%		100%		100%		100%		100%		100%		84%		83%		93%		92%		100%		100%		100%		98%		97%		95%
		>1 & <2	47%		49%		0%		0%		0%		0%		0%		0%		0%		0%		0%		16%		13%		7%		8%		0%		0%		2%		3%		5%		
		>2 & <10	0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		4%		0%		0%		0%		0%		0%		0%		0%		
		>10	0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		
Change in duration of exceedence		<1	-2%				0%				0%			0%			0%					0%						-1%				0%				-2%			-2%				
		>1 & <2	2%				0%				0%			0%			0%					0%				-4%		1%				0%			2%			2%					
		>2 & <10	0%				0%				0%			0%			0%					0%				4%		0%				0%			0%			0%					
		>10	0%				0%				0%			0%			0%					0%				0%		0%				0%			0%			0%					



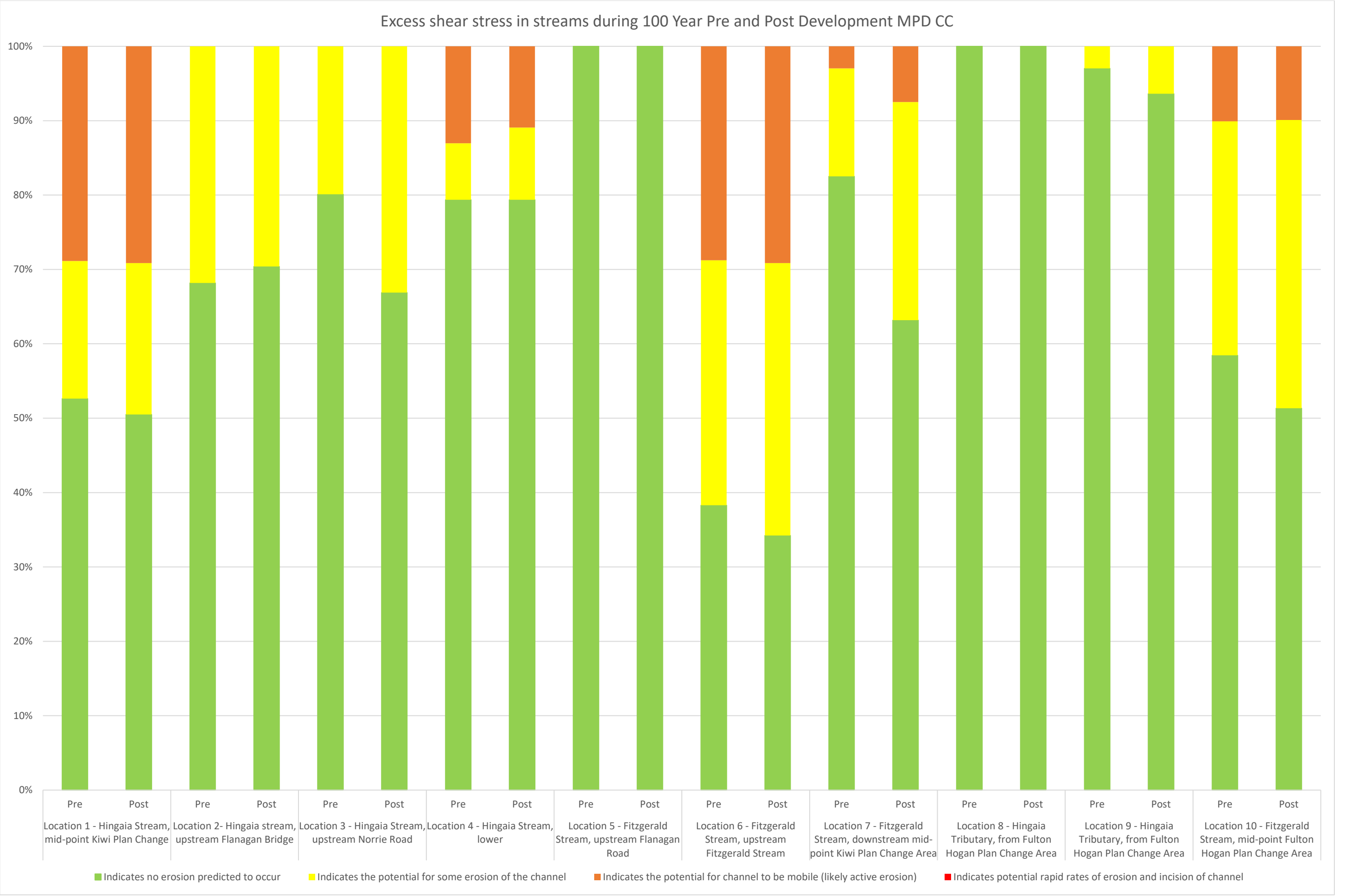
[illegible]

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Excess shear stress in streams during 10 Year Pre and Post Development MPD CC

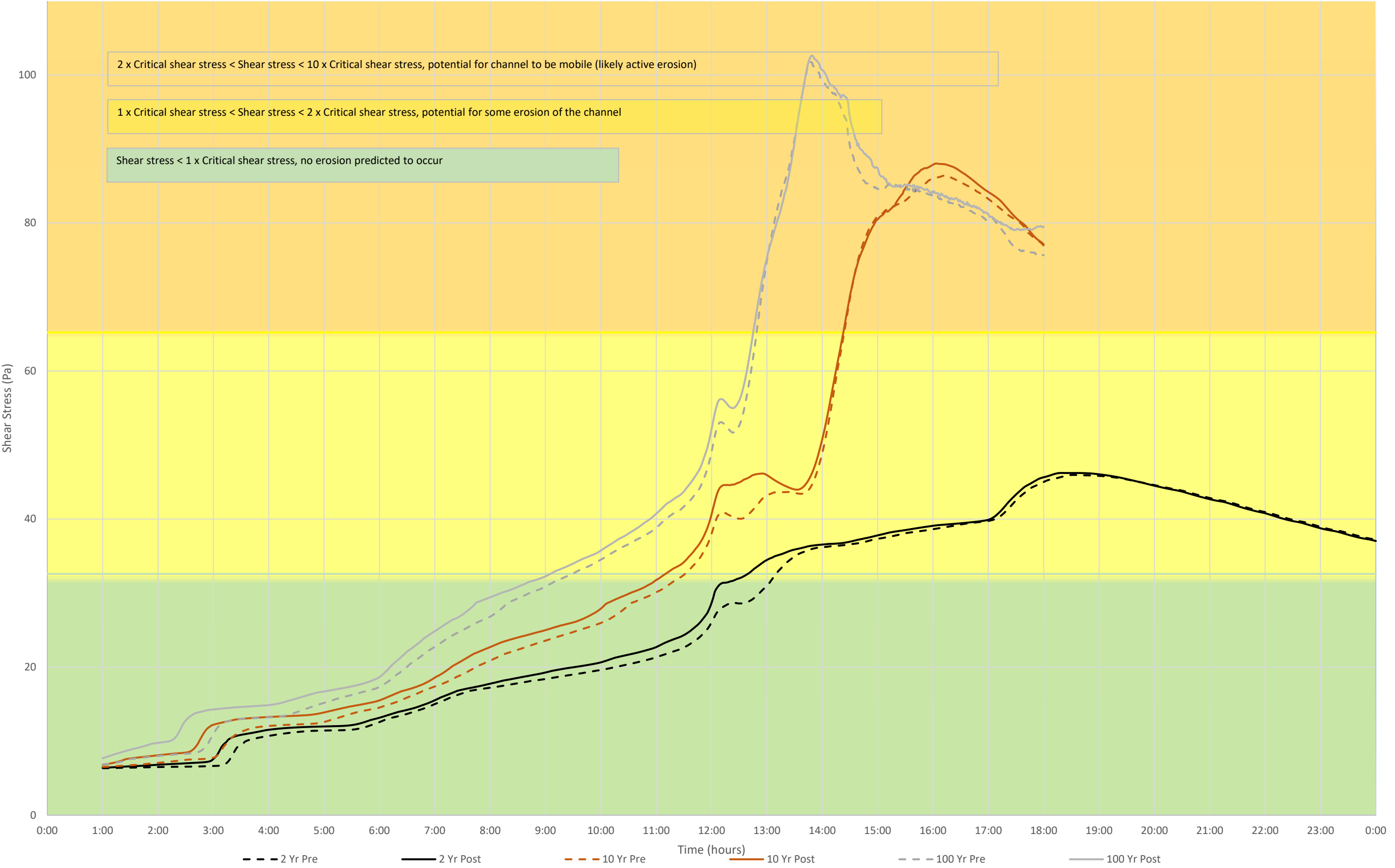


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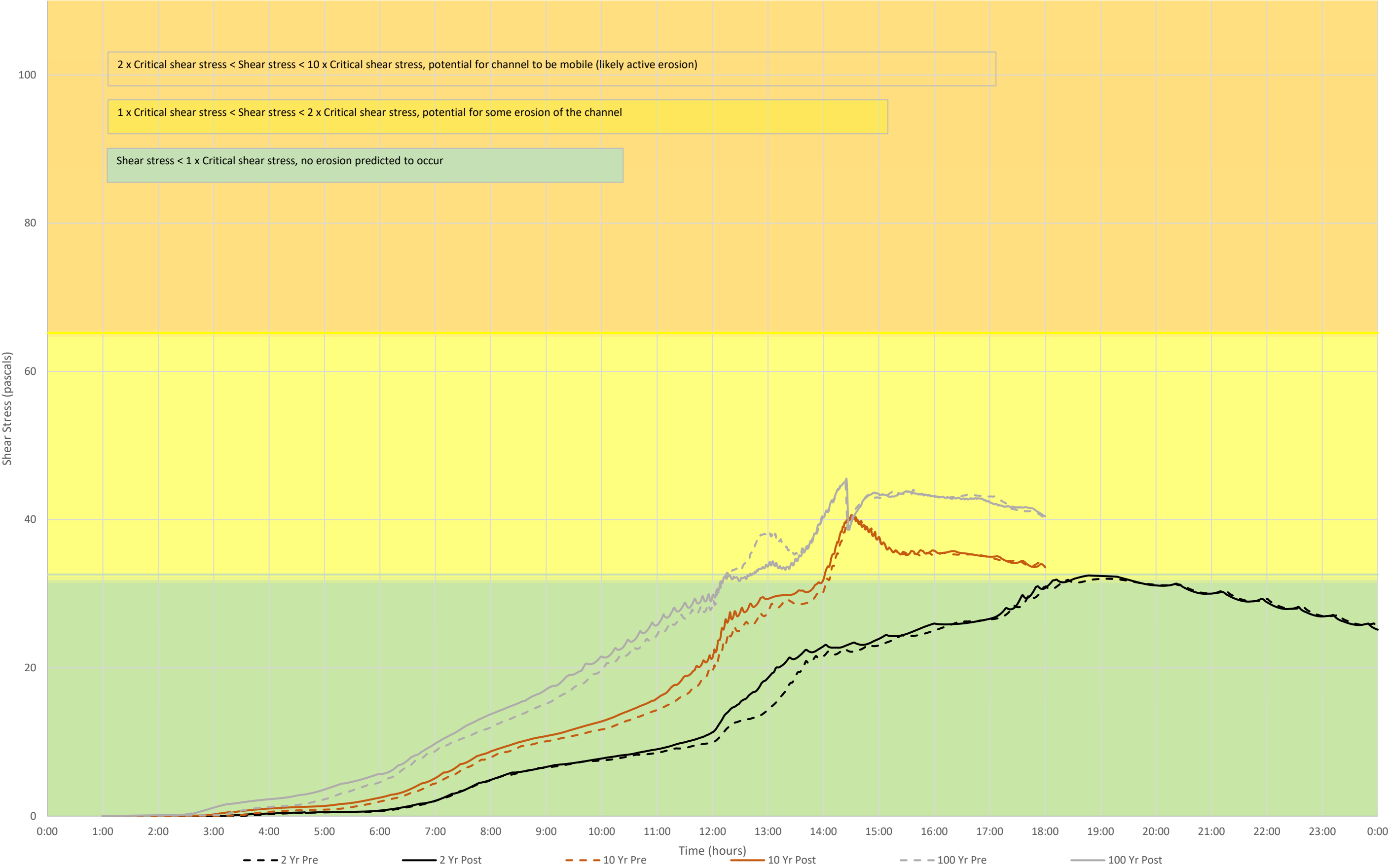


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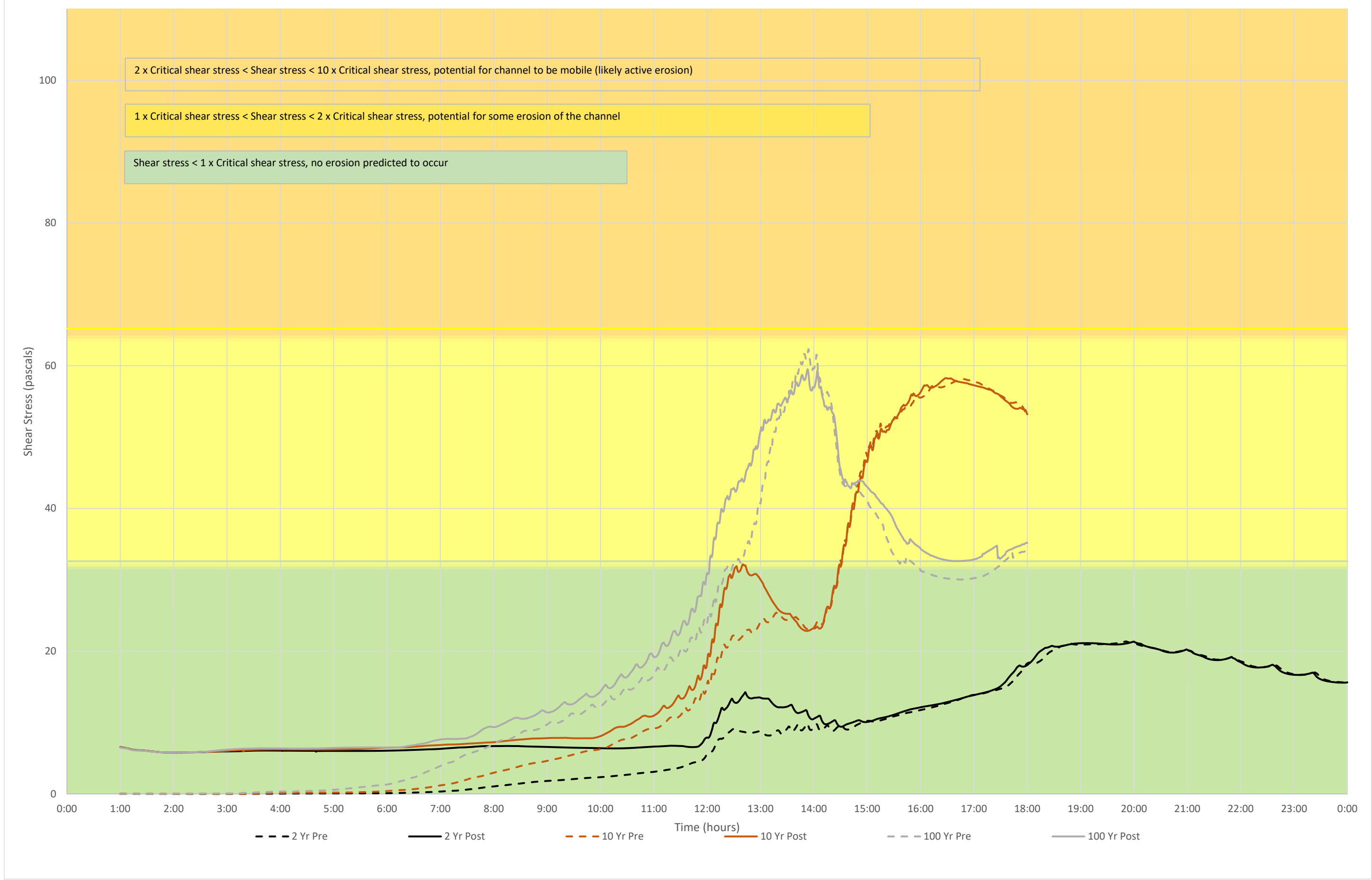
Shear Stress at Location 1 - Hingaia Stream, mid-point Kiwi Plan Change



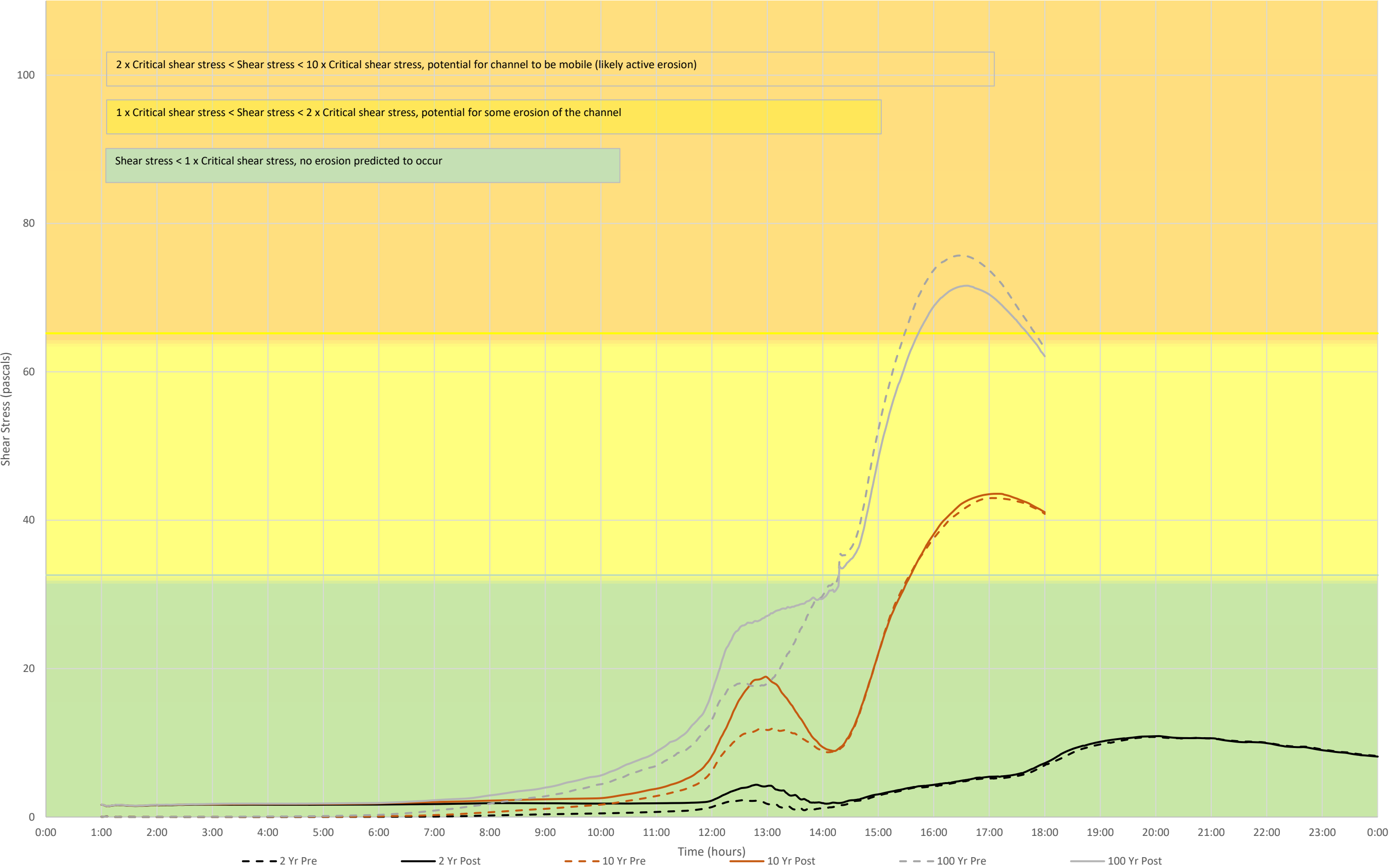
Shear Stress at Location 2 - Hingaia stream, upstream Flanagan Bridge



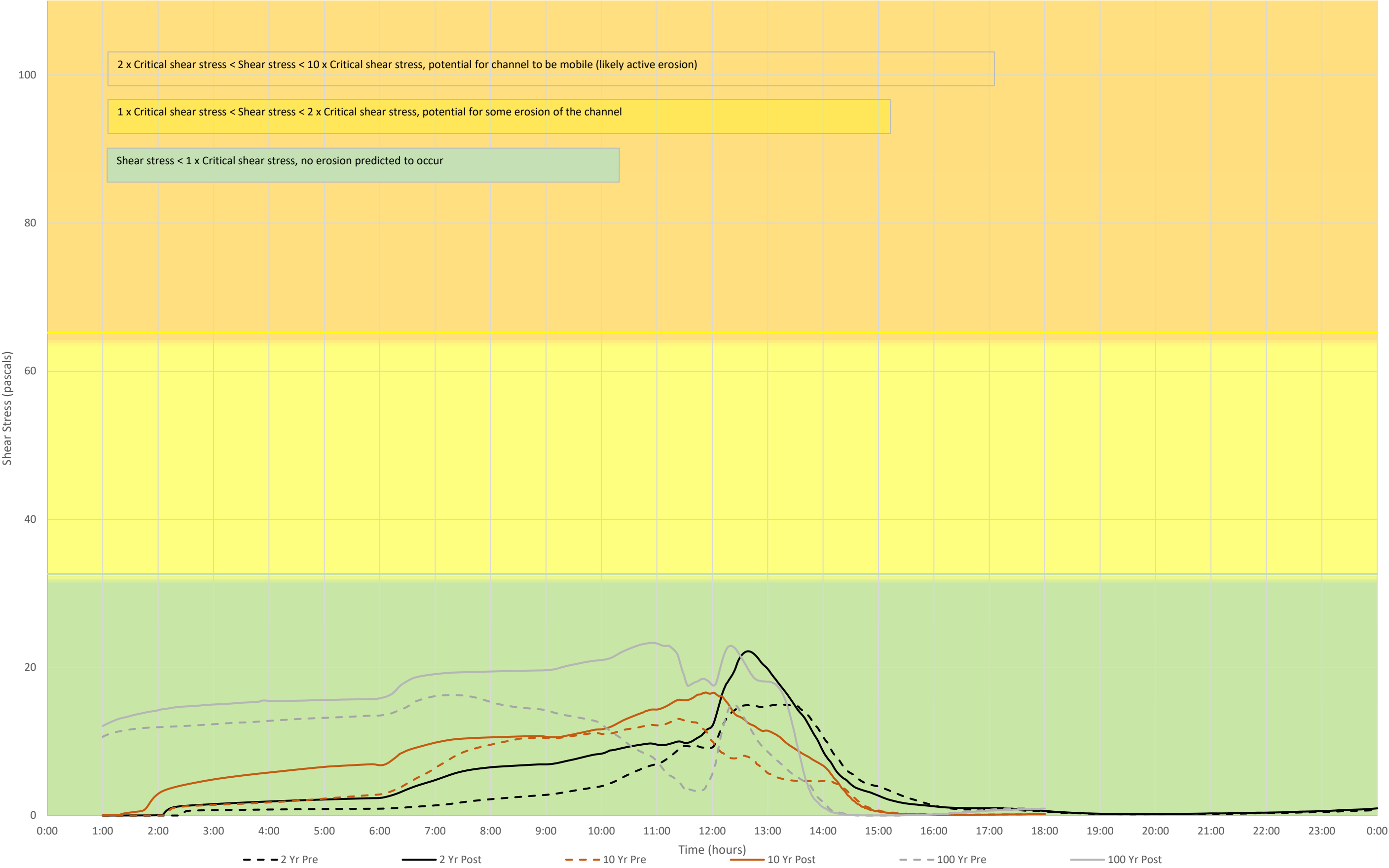
Shear Stress at Location 3 - Hingaia Stream, upstream Norrie Road



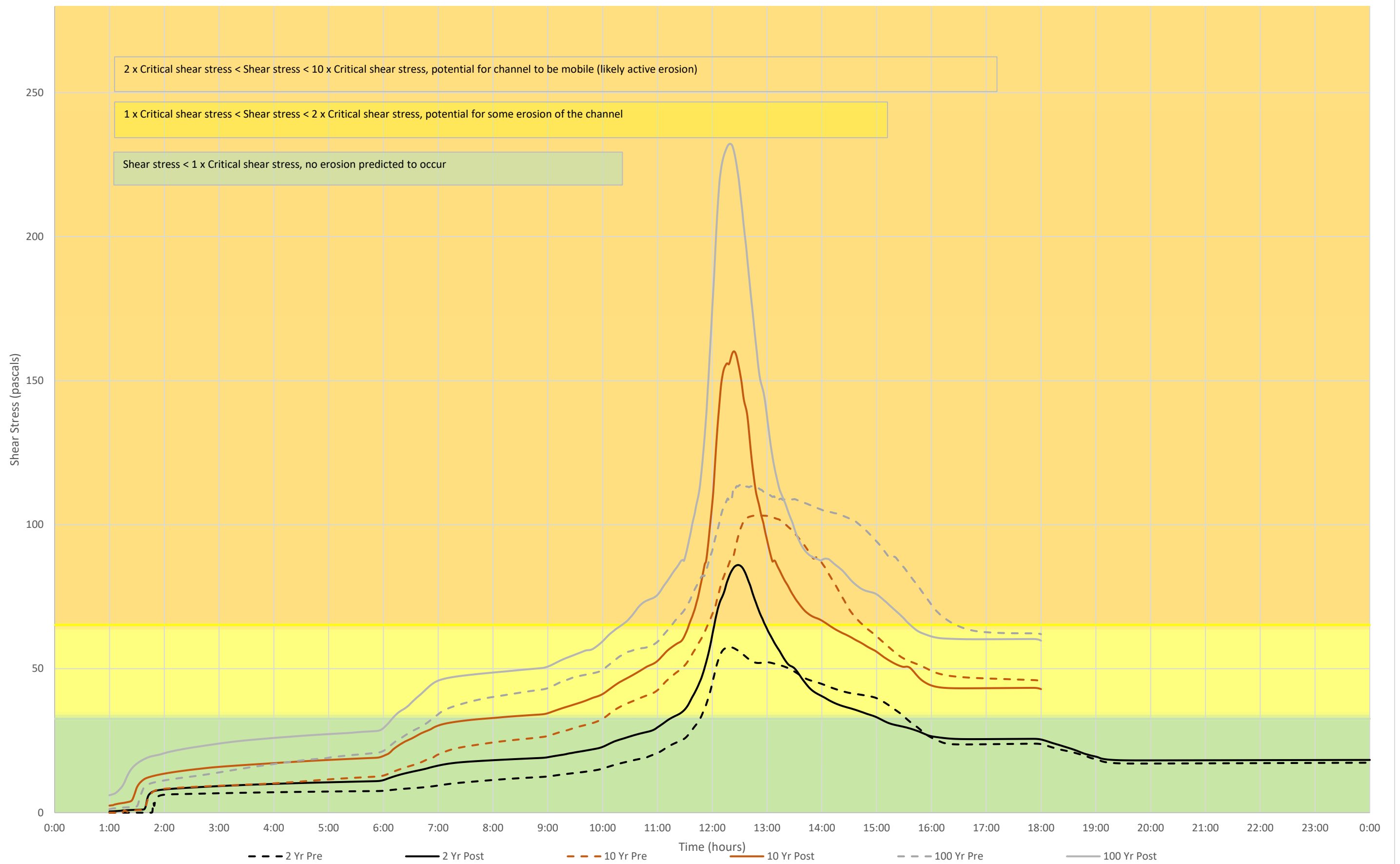
Shear Stress at Location 4 - Hingaia Stream, lower



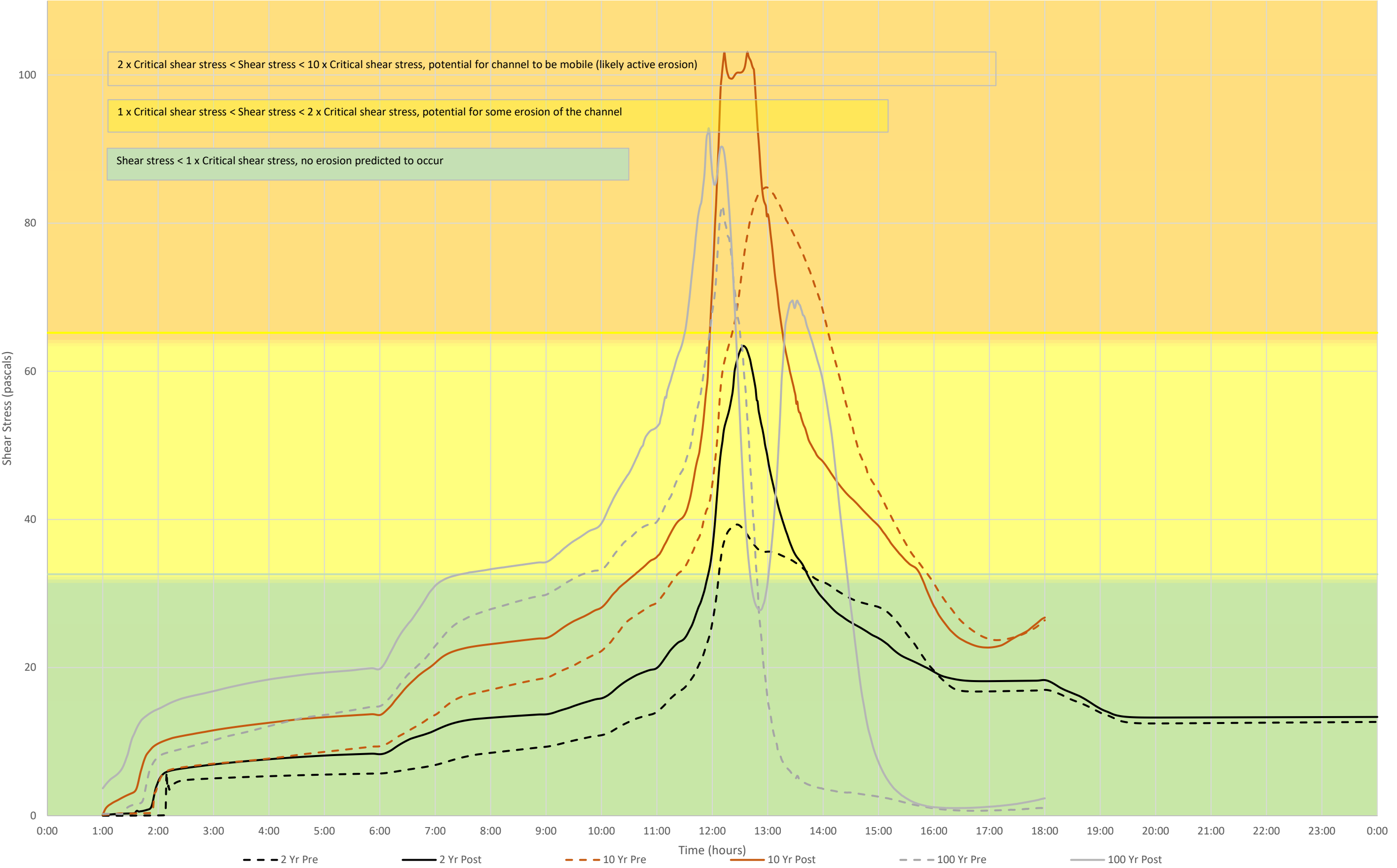
Shear Stress at Location 5 - Fitzgerald Stream, upstream Flanagan Road



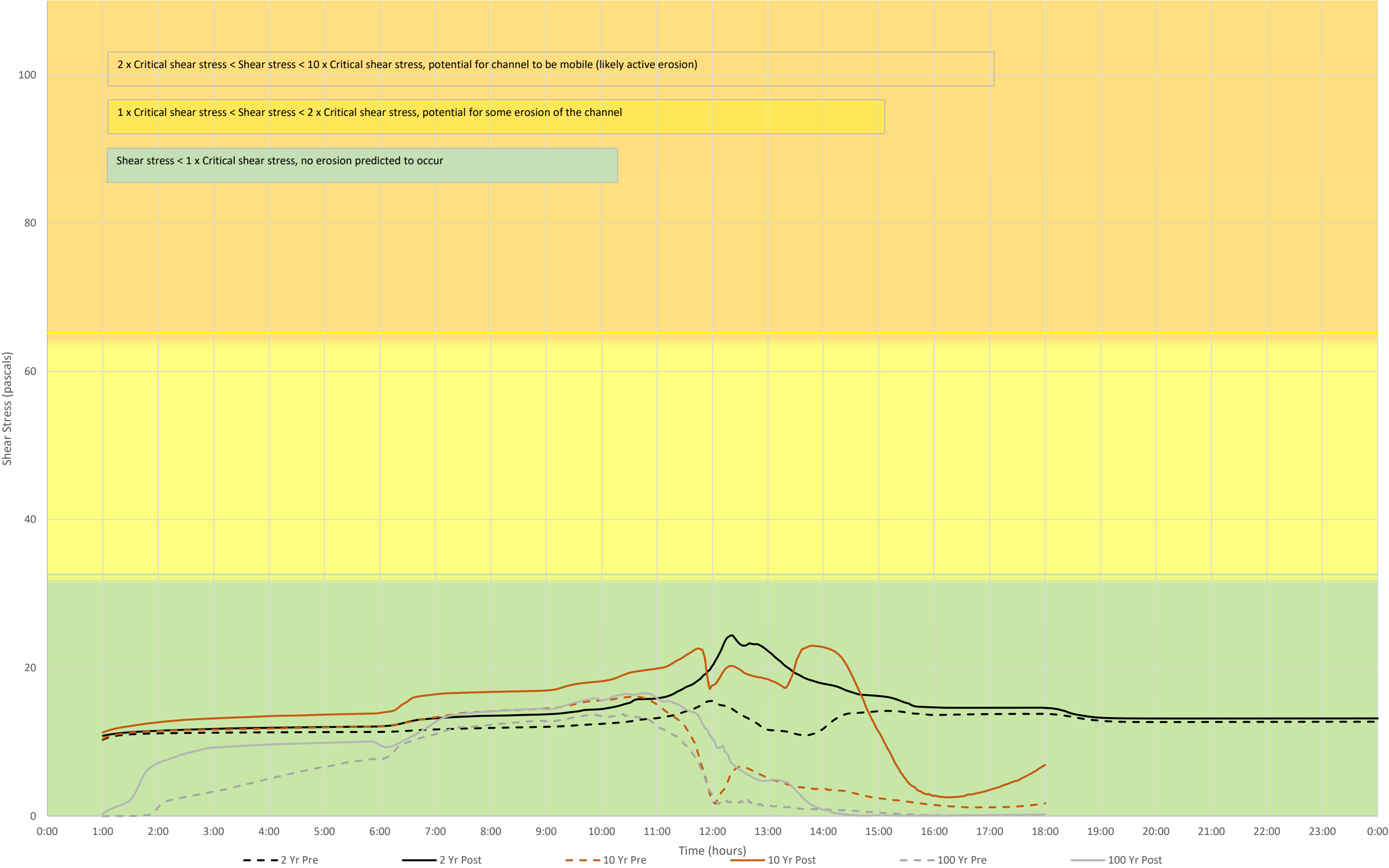
Shear Stress at Location 6 - Fitzgerald Stream, upstream Fitzgerald Stream



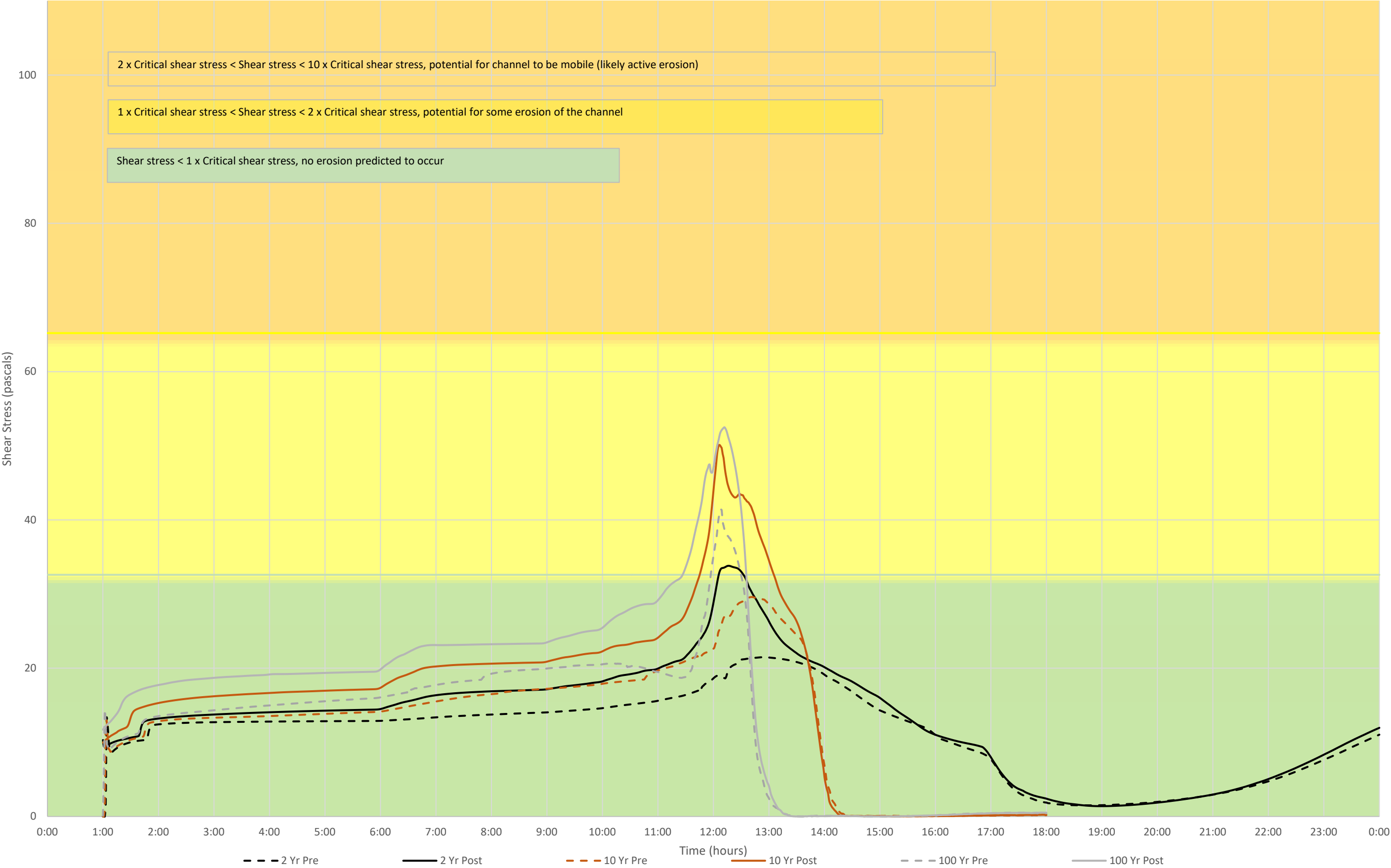
Shear Stress at Location 7 - Fitzgerald Stream, mid-point Kiwi Plan Change Area



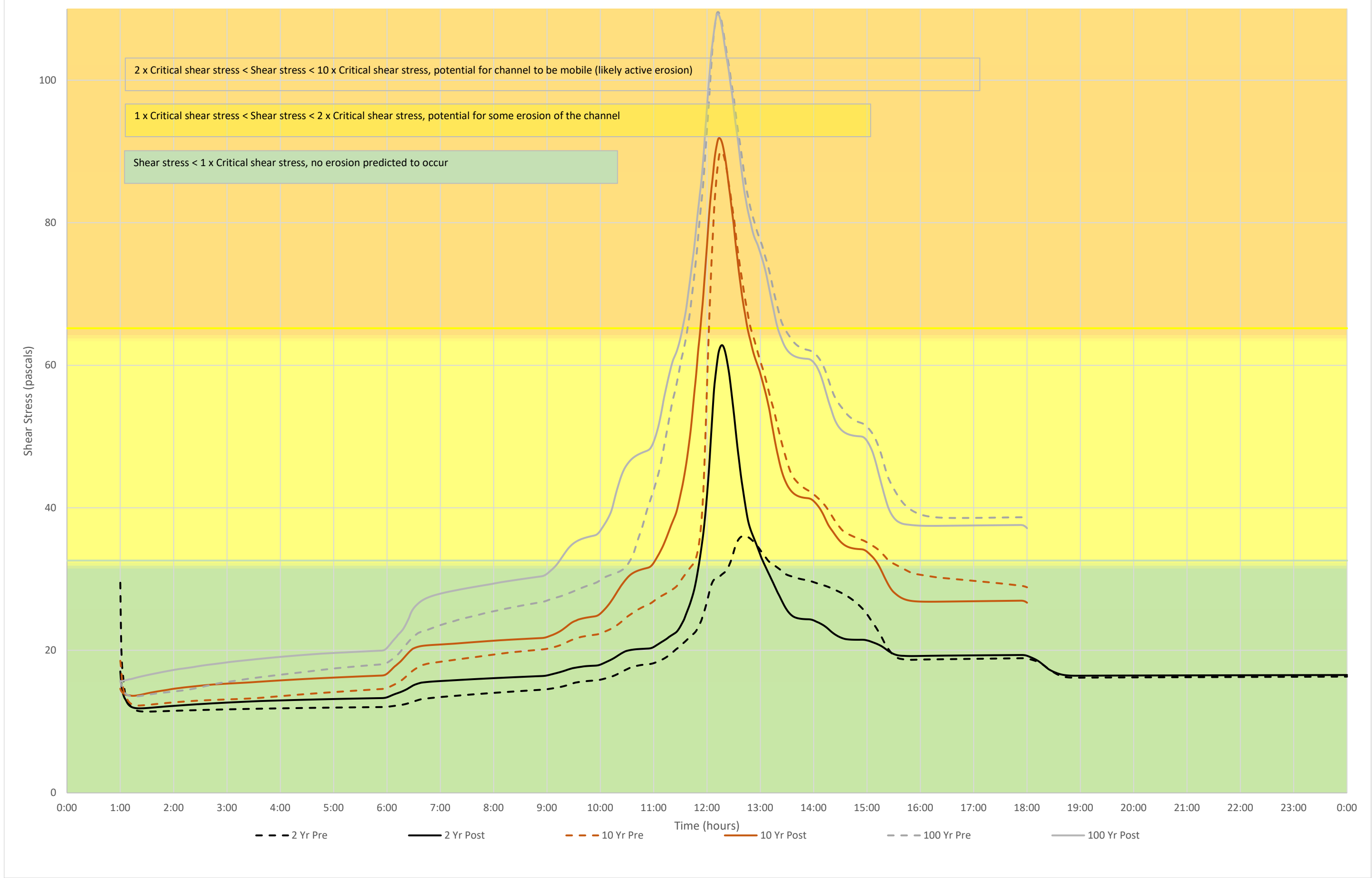
Shear Stress at Location 8 - Hingaia Tributary, from Fulton Hogan Plan Change Area



Shear Stress at Location 9 - Hingaia Tributary, from Fulton Hogan Plan Change Area



Shear Stress at Location 10 - Fitzgerald Stream, mid-point Fulton Hogan Plan Change Area



ARI event	2 year
Location	1

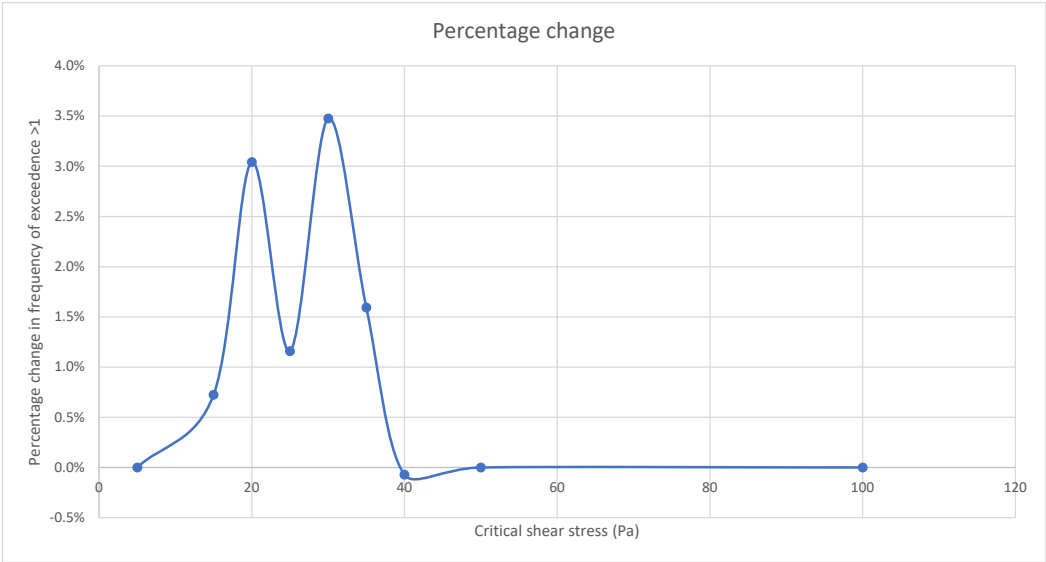
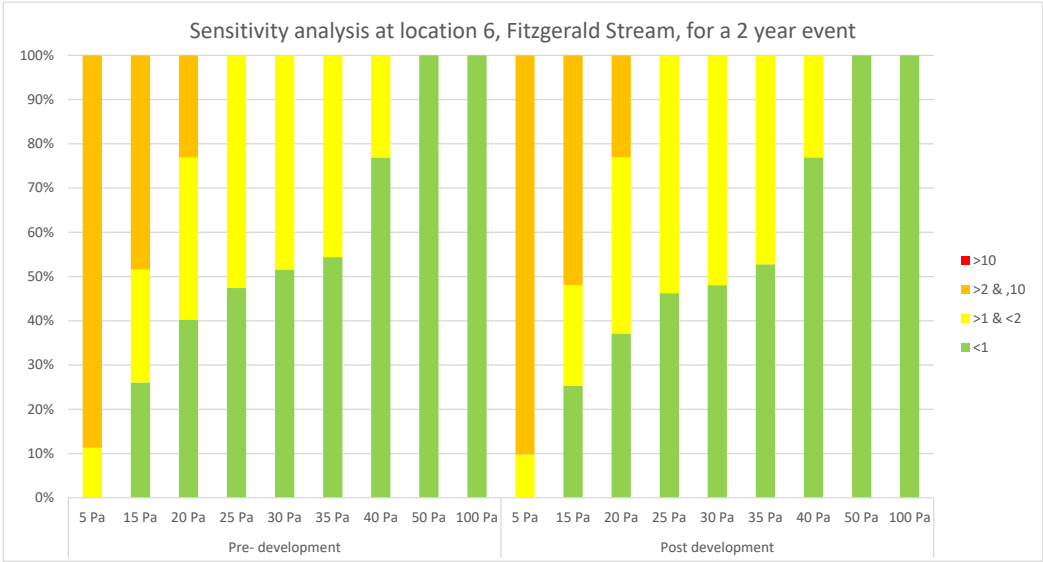
Frequency of exceedence

	Pre- development										Post development									
	5 Pa	15 Pa	20 Pa	25 Pa	30 Pa	35 Pa	40 Pa	50 Pa	100 Pa		5 Pa	15 Pa	20 Pa	25 Pa	30 Pa	35 Pa	40 Pa	50 Pa	100 Pa	
<1	0	360	556	655	712	751	1062	1381	1381		0	350	512	639	664	729	1061	1381	1381	
>1 & <2	156	352	506	726	669	630	319	0	0		135	314	549	742	717	652	318	0	0	
>2 & ,10	1225	669	319	0	0	0	0	0	0		1246	717	318	0	0	0	0	0	0	
>10	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
Total number of events	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000		1381.000	1381.000	1379.000	1381.000	1381.000	1381.000	1379.000	1381.000	1381.000	

Change in exceedence of critical shear threshold from pre- to post-development

	Critical shear stress								
	5	15	20	25	30	35	40	50	100
>1	0.0%	0.7%	3.0%	1.2%	3.5%	1.6%	-0.1%	0.0%	0.0%

Max % change	3.5%
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ARI event	2 year
Location	6

Frequency of exceedence

	Pre- development										Post development									
	5 Pa	15 Pa	20 Pa	25 Pa	30 Pa	35 Pa	40 Pa	50 Pa	100 Pa		5 Pa	15 Pa	20 Pa	25 Pa	30 Pa	35 Pa	40 Pa	50 Pa	100 Pa	
<1	52	537	910	1099	1138	1168	1199	1300	1381		42	343	802	912	1116	1185	1236	1282	1381	
>1 & <2	321	601	289	201	243	213	182	81	0		139	773	434	370	198	150	121	99	0	
>2 & ,10	1008	243	182	81	0	0	0	0	0		1200	265	145	99	67	46	24	0	0	
>10	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
Total number of events	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000		1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	1381.000	

Change in exceedence of critical shear threshold from pre- to post-development

	Critical shear stress								
	5	15	20	25	30	35	40	50	100
>1	0.7%	14.0%	7.8%	13.5%	1.6%	-1.2%	-2.7%	1.3%	0.0%

Max % change	14.0%
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